

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-200



Silver and black models

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK \triangle ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

SPECIFICATIONS

AMPLIFIER SECTION

Power Output:	38 watts per channel, min. RMS, at 8 ohms, both channels driven, from 20 Hz to 20 kHz, with no more than 0.08% THD.
Music Power Output:	2 x 80 watts at 4 ohms, 1 kHz (DIN) 2 x 53 watts at 8 ohms, 1 kHz (DIN)
Continuous Power Output:	2 x 50 watts at 4 ohms, 1 kHz (DIN) 2 x 40 watts at 8 ohms, 1 kHz (DIN)
Total Harmonic Distortion:	0.08% at rated power 0.08% at 1 watt output
IM Distortion:	0.08% at rated power 0.08% at 1 watt output
Damping Factor:	35 at 8 ohms
Frequency Response:	20 - 30,000 Hz ± 1 dB
RIAA Deviation:	20 - 20,000 Hz ± 0.8 dB
Sensitivity and Impedance:	Phono: 2.5 mV/50 kohms Tape Play: 150 mV/50 kohms Tape Rec: 150 mV/3.5 kohms (phono)
Phono Overload:	180 mV RMS at 1kHz, 0.08% THD
Signal-to-Noise Ratio:	Phono: 85 dB (at 10mV input, A weighted) 75 dB (IHF A-202) Tape: 95 dB (A weighted) 80 dB (IHF A-202)
Tone Controls:	Bass: ± 8 dB at 100 Hz Treble: ± 8 dB at 10 kHz
Loudness (-30 dB):	+7 dB at 70 Hz, +5 dB at 10 kHz

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AUDIO COMPONENTS

TUNER SECTION**FM:**

Tuning Range:	87.5 — 108.0 MHz (50 kHz steps)
Usable sensitivity:	Mono: 12.8 dBf, 1.2 μ V
	Stereo: 18.0 dBf, 2.2 μ V
50 dB Quieting Sensitivity:	Mono: 18.0 dBf, 2.2 μ V
	Stereo: 37.2 dBf, 20 μ V
Capture Ratio:	1.5dB
Image Rejection Ratio:	85 dB
IF Rejection Ratio:	90 dB
Signal-to Noise Ratio:	Mono: 71 dB
	Stereo: 66 dB
Selectivity:	50 dB DIN (\pm 300 kHz 40 kHz dev.)
AM Suppression Ratio:	50 dB
Harmonic Distortion:	Mono: 0.15%
	Stereo: 0.3%
Frequency Response:	30 — 15,000 Hz \pm 1.5 dB
Stereo Separation:	40 dB at 1 kHz
	30 dB at 100 — 10,000 Hz
Tuning Level (Hi/Lo):	—
Muting Level:	17.2 dBf, 4.0 μ V
Stereo Threshold:	17.2 dBf, 4.0 μ V

AM:

Tuning Range:	522 — 1,611 kHz (9 kHz steps)
Usable Sensitivity:	30 μ V
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	30 dB
Signal-to-Noise Ratio:	40 dB
Harmonic Distortion:	0.8%

GENERAL:

Semiconductors:	EETs: 6 TR: 34 ICs: 10
	Diodes: 81
Dimensions (WxHxD):	418 x 112 x 340 mm
	(16 1/2" x 4 1/2" x 13 3/8")
Weight:	7.1 kg, 15.6 lbs.

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SERVICE PROCEDURES

1. Replacing the fuses

For continued protection against fire hazard, replace only with same type and same rating fuse.

Circuit no.	Parts no.	Description
F501, F601	252076	3. 15A-SE-EAK, Speaker
F902	252074	2A-SE-EAK, Primary
F903, F904	252078	5A-SE-EAK, Secondary
F905, F906	252070	1A-SE-EAK, Secondary
F907	252088	250mA-SE-EAK, Secondary

2. Replacing the lamps

This unit uses the lamps listed below.

Circuit no.	Parts no.	Description
PL901, PL902	210162	PL 6.3V, 250mA, Dial plate illumination

Remove the top cover.

Remove the front panel.

Remove the holder.

(See fig. 2)

3. Disassembling procedures

Selector switch pc board

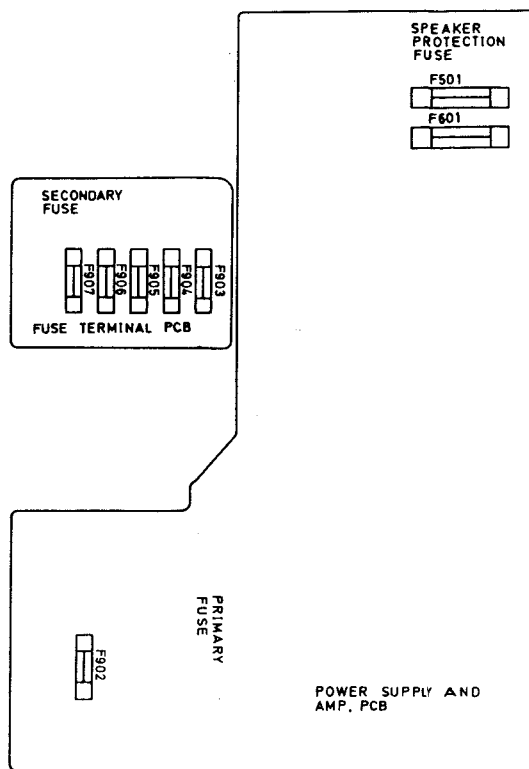
Remove the top cover.

Remove the all screws on the back panel.

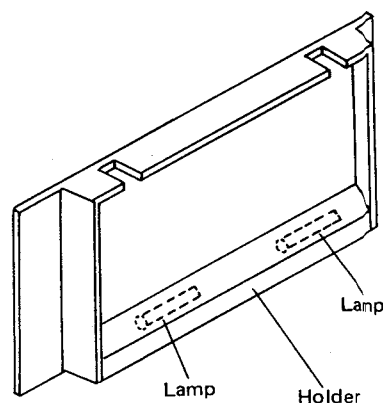
Remove a screw holding the radiator and bracket, pcb.

4. Memory Preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory, the power switch must be turned on and off a few times each month to keep the back-up system operable. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and the location and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.



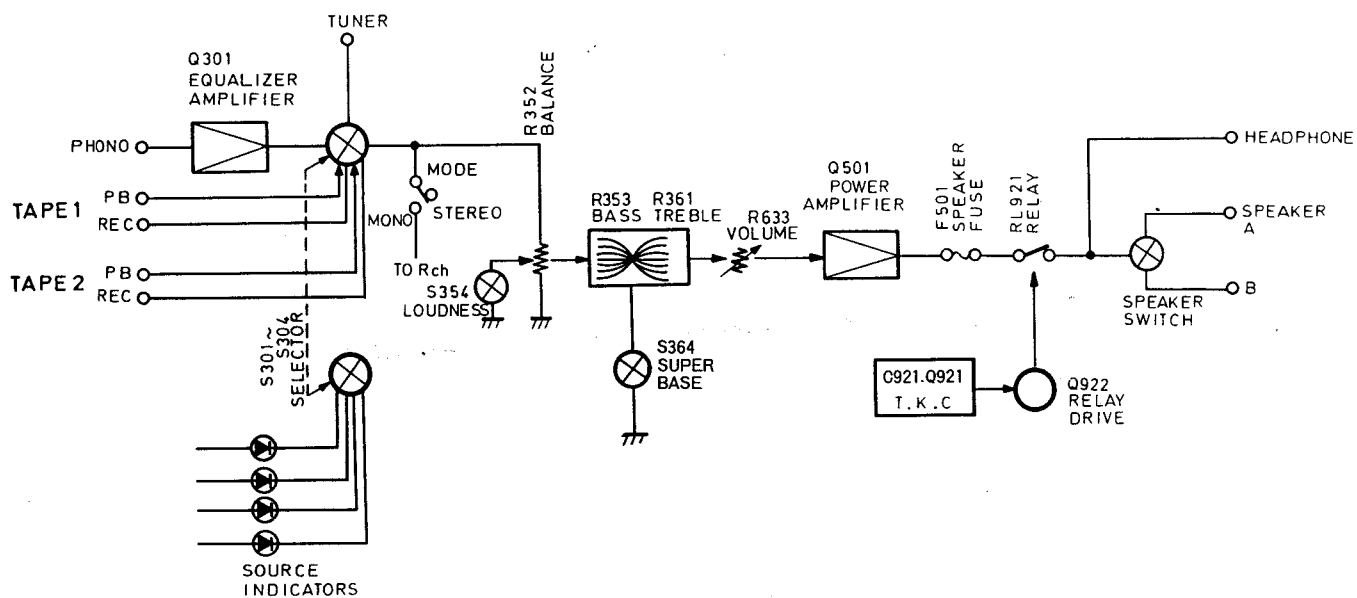
(fig. 1)



(fig. 2)

BLOCK DIAGRAM

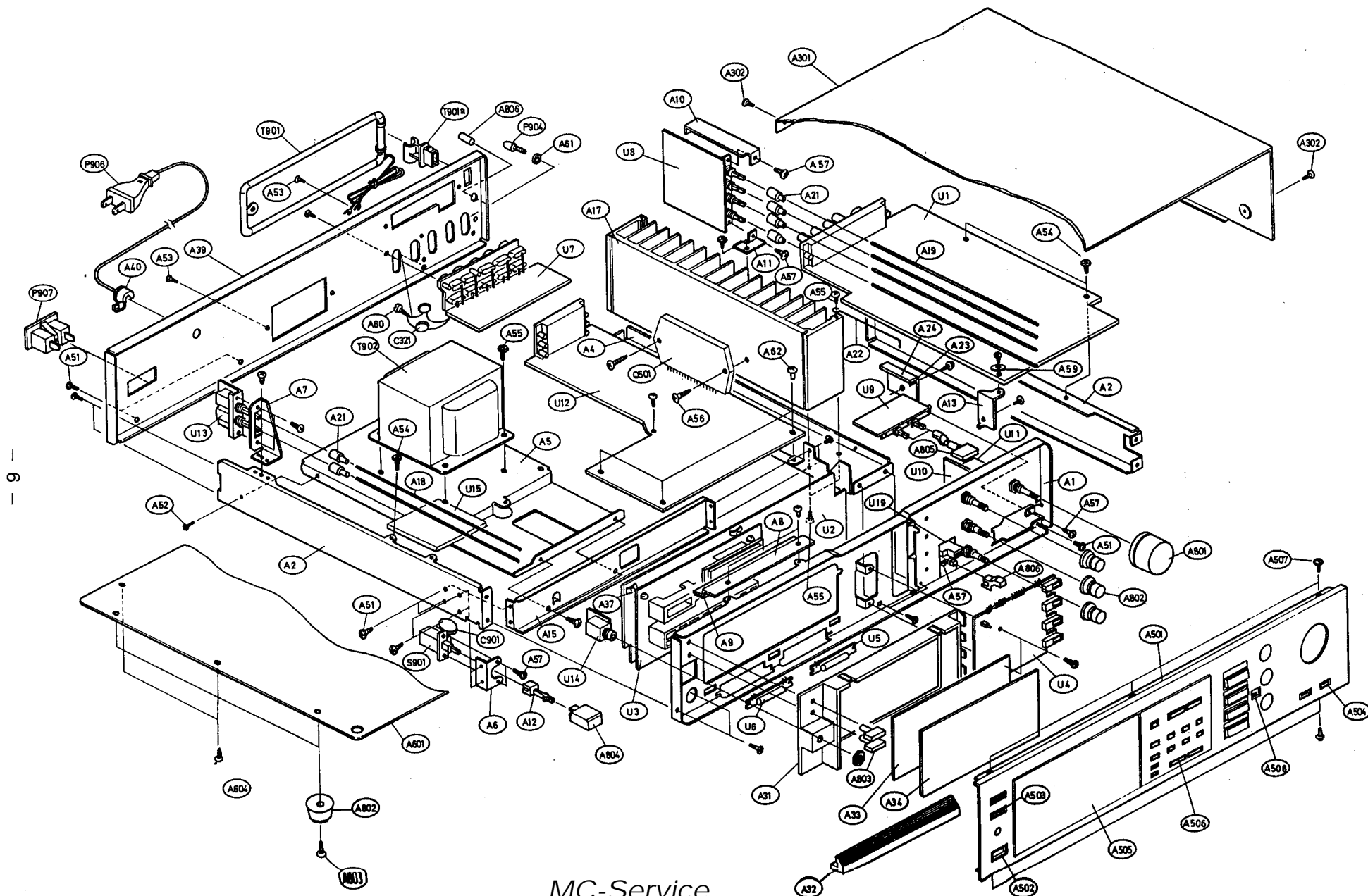
Amplifier section




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EXPLODED VIEW



NOTE: THE COMPONENTS IDENTIFIED BY MARK  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

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Notes: (S): Only silver model
(B): Only black model

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
A1	27110202-1A	Front bracket
A2	27115145A	Side bracket
A4	27130339B	Bracket,radiator
A5	27130340A	Bracket,power transformer
A6	27140805	Bracket,power
A7	27140806	Bracket,speaker
A8	27140807	Bracket,holder
A9	28140260	1.5 x 10 x 100mm,Cushion
A10	27140808	Bracket,selector
A11	27140809A	Bracket S
A12	27260062	Shaft,switch
A13	27140810A	Bracket,PCB
A15	27130341	Bracket F
A17	27160132	Radiator
A18	27260123	Shafi
A19	27260124	Shafi
A21	28320135	Connector
A22	27300656	Spring
A23	27140928	Bracket PCS
A24	28175100	Insulating plate
A31	27190220	Holder,pcb
A32	27190221	Holder,lamp
A33	28133102	Back plate
A34	28130216	Dial plate
A37	27190011	Holder
A39	27120594	Back panel
A40	270280	SR4K-4,Strainrelief
A51	834430068	3TTS+ 6B(BC),Tapping screw
A52	838430068	3TTB+ 6B(BC),Tapping screw
A53	834430108	3TTS+ 10B(BC),Tapping screw
A54	831130088	3TTW+ 8B,Tapping screw
A55	838440089	4TTB+ 8C(BC),Tapping screw
A56	834430168	3TTS+ 16B(BC),Tapping screw
A57	82143006	3P+6FN(BC),Pan head screw
A61	87613010	W3x10F,Washer
A62	831430088	3TTW+ 8B(BC),Tapping screw
A301	28184201	Top cover(S)
A301	28184202	Top cover(B)
A302	834430068	3TTS+ 6B(BC),Tapping screw
A501	18152121	Front panel ass'y (S)
A502	27267215	Guide,power
A503	27267280	Guide,speaker
A504	27267282	Guide,push
A505	28198607	Clear plate
A506	28321583	Knob ass'y
A508	27267333	Guide S
A502	27267215	Guide,power
A503	27267280	Guide,speaker
A504	27267282	Guide,push
A505	28198607	Clear plate
A506	28321584	Knob ass'y
A508	27267333	Guide S

REF. NO.	PART NO.	DESCRIPTION
A507	834430068	3TTS+ 6B(BC),Tapping screw
A509	29110050	Aluminium tape on the front panel
A601	27170160	Bottom board
A602	27175009A	Leg
A603	834430128	3TTS+ 12B(BC),Tapping screw
A604	831430088	3TTW+ 8B(BC),Tapping screw
A801	28320543-1	Knob,volume (S)
	28320892	Knob,volume (B)
A802	28321205	Knob,balance (S)
	28321206	Knob,balance (B)
A803	28321207	Knob,push (S)
	28321208	Knob,push (B)
A804	28320852	Knob,power (S)
	28321160	Knob,power (B)
A805	28321215	Knob,push (S)
	28321216	Knob,push (B)
A806	28321522	Knob,push (S)
A806	28321523	Knob,push (B)
C901	3500065A	0.01μF,AC400V/125V,Capacitor IS
△ C901a	27300601	Cover for C901
C990	335622230	0.022μF,50V, Ceramic capacitor
△ F501,F601	252076	3.15A-SE-EAK,Speaker protection fuse
△ F902	252074	2A-SE-EAK,Primary fuse
△ F903,F904	252078	5A-SE-EAK,Secondary fuse
△ F905,F906	252070	1A-SE-EAK,Secondary fuse
△ F907	252088	250mA-SE-EAK,Secondary fuse
P904	25060044	Terminal,ground
△ P906	253083-1	AS-CEE,Power supply cord
S908	223004-1	Terminal
Q501,Q601	222041	STK-4843,Power amplifier IC
△ S901	25035398	NPS-111-L362P,Power switch
T901	232085	NNMA-AM loop antenna
T901a	27190105	Holder,antenna
△ T902	230788	NPT-837G,Power transfrmer
U1	18154509A	NARF-2009a,FM/AM tuner pc board ass'y
U2	18034539A	NADG-1739a,Digital circuit pc board ass'y
U3	18008540	NADIS-1740,Fluorescent indicator pc board ass'y
U4	18008541	NASW-1741,Tuner switch circuit pc board ass'y
U5	18008543	NAPL-1743,Dial plate illumination lamp pc board ass'y
U6	18008544	NAPL-1744,Dial plate illumination lamp pc board ass'y
U7	18154512A	NAEQ-2012a,Equalizer amplifier pc board ass'y

REF. NO.	PART NO.	DESCRIPTION
U8	18148513	NASW-2013,Selector switch pc board ass'y
U9	18148514	NASW-2014,Mode/ loudness switch pc board ass'y
U10	18148515	NATC-2015,Tone control circuit pc board ass'y
U11	18148516	NAVR-2016,Volume control pc board ass'y
U12	18154531A	NAAF-2031a,Power supplyand power amplifier pc board ass'y
U13	18148532	NASW-2032,Speaker selector switch pc board ass'y
U14	18148533	NAHP-2033,Headphone terminal pc board ass'y
U15	18154534	NAFU-2034,Fuse terminal pc board ass'y
U19	18148517	NATS-2017,Super base switch pc board ass'y

MC-Service

CIRCUIT DESCRIPTIONS

1. Synthesizer and controller operation

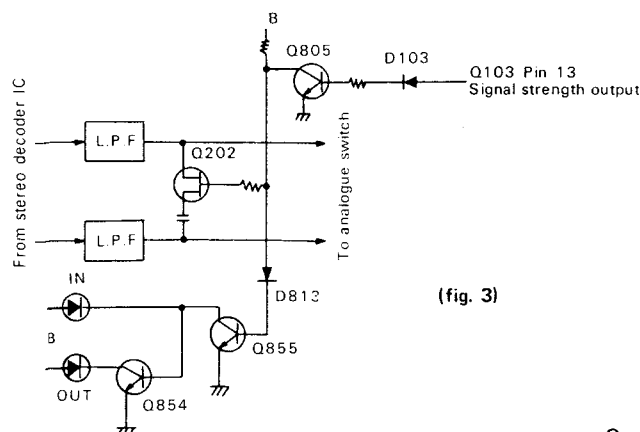
Pin N°	Symbol	Terminal	Description
	GND	Ground	
2	XT	X'tal	Connected to the 7.2MHz crystal oscillator for the reference frequency.
3	XT		
4	FM	FM band specification input	Mutual reset type, performs switching of each band, FM/MW/LW.
5	MW	MW band specification input	
6	LW	LW band specification input	
7	MANUAL	Manual tuning mode specification input	Mutual reset type, performs auto search and manual operation mode switching during UP/DOWN tuning.
8	AUTO	Auto search tuning mode specification input	
9	UP	UP tuning key input	Connect the push key and perform UP/DOWN tuning.
10	DOWN	DOWN tuning key input	
11	STO	Memory store command input	The preset memory is set to the write mode when the key is pressed.
12-19	M1-M8	Preset memory channel specification input	Controls the write and read out of the internal 16-station preset memory along with the MC1 and MC2 input.
20	MC-1	Memory control input	Set the 16-station preset memory to the 8 FM/8 AM station mode or the FM/MW/LW 3-band 16-station random mode. The 8 FM/8 AM mode is used in this unit.
21	MC-2		
22	OSC2	AM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the AM search mode.
23	OSC1	FM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the FM search mode.
24	O/5	FM 50 kHz output	Output that represents the 50kHz FM band tuning step for European models. Goes to the high level for the 50 kHz setting.
25	CK2	Tuned frequency data output	Outputs the serial data and timing clock to the tuned frequency display driver.
26	CK1		
27	DATA		
28	MUTE	Muting signal output	Goes to the high level during muting output.
29	E2	Regin specification input	See table 1.
30	E1		
31	STOP 3	AM IF signal input	During AM reception, this counts the IF signal and stops auto search.
32	STOP 2	Auto search stop signal input	When the stop 1 input (pin 33) is at the high level and this terminal goes to the high level, auto search is stopped.
33	STOP 1	Scan speed slow input	When the high level is input at this terminal, the auto search speed is cut in half.

Pin No.	Symbol	Terminal	Description
34	DO1	Error output	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided oscillation frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies match. The output is applied to the variable capacitor diode in the front end through low pass filter Q703 and Q704. The output from both terminals is the same, but only DO1 is used.
35	DO2		
36	TEST	Test terminal	Test mode at the high level.
37	FM IN	FM programmable counter input	Connect to the prescaler output (Pin3 of Q701)
38	PSC	Pulse swallow control output	Output to the control the division ratio of the prescaler.
39	AM IN	AM local oscillator signal input	Terminal for input of AM broadcast signal.
40	$\overline{\text{INH}}$	Inhibit input	Operates normally at the high level. Inhibit status at the low level.
41	$\overline{\text{INT}}$	Initialize input	Operates normally at the high level. At the low level, the internal status is initialized.
42	V _{DD}	Power supply	Device power terminal; supplies 5V during the normal operation and 2.5V from the super capacitor (C715) for memory preservation.

table 1.

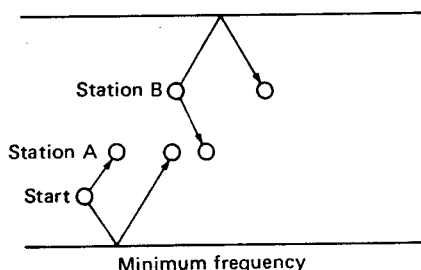
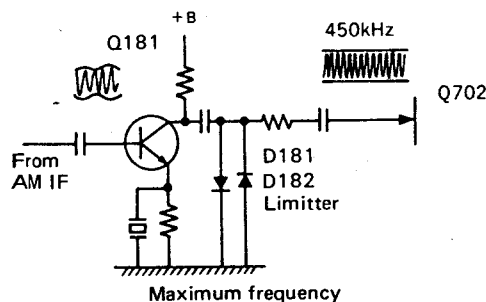
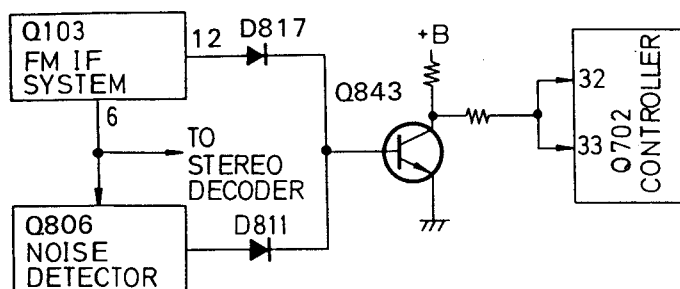
E1 (Pin 30)	E2 (Pin 29)	Regin	Band	Frequency range	Intermediate frequency	Scan step	Reference frequency
0	1	U.S.A	FM	87.5 ~ 108.0 MHz	+10.7 MHz	100 kHz	25 kHz
			AM1	520 ~ 1 710 kHz	+450 kHz	10kHz	10 kHz
1	1		AM2	522 ~ 1 710 kHz	+450 kHz	9kHz	9kHz
1	0	Europe	FM	87.50 ~ 108.00 MHz	+10.7 MHz	50 kHz	25 kHz
			MW	522 ~ 1611 kHz	+450 kHz	9 kHz	9 kHz
			LM	153 ~ 360 kHz	+450 kHz	1 kHz	1 kHz
0	0	Japan	FM	76.0 ~ 90.0 MHz	- 10.7 MHz	100 kHz	25 kHz
			AM	522 ~ 1611 kHz	+450 kHz	9 kHz	9 kHz

2. Auto-Hi-blend circuit



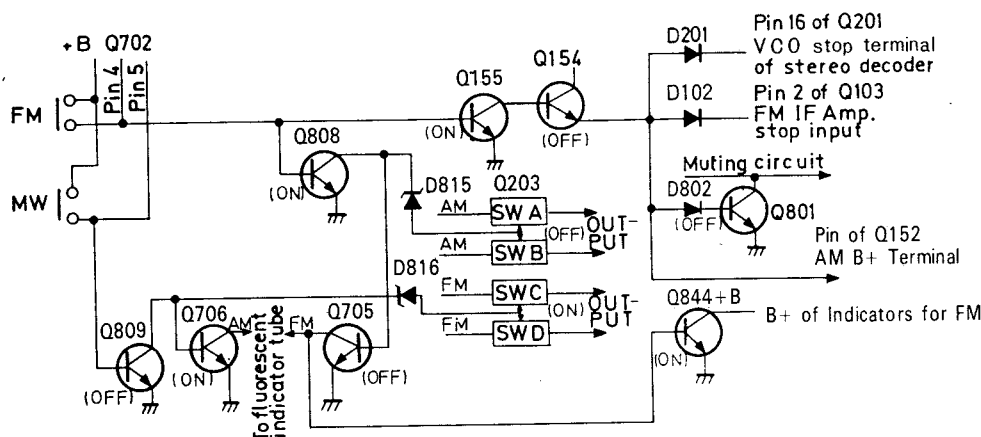
There is a 3-stage IF level detection circuit in the IC of Q103. A direct current voltage approximately proportional to the electrical field intensity is output from output pin 13. This is used to turn off Q805 and turn on Q202 when the electrical field is weak and, making use of the fact that the phase of noise components in the high range of stereo broadcasts is reversed left-right, the left and right channels are mixed in the high range to reduce noise. At the same time, Q855 is turned on and Q854 is turned off, and the IN LED of filter lights on.

3. Auto-search tuning circuit



(fig. 4)

4. FM/AM selector circuit



(fig. 5)

The FM/AM selector circuit is shown in the diagram, fig. 5. Pins 4 and 5 of Q702 are of the mutual reset type. For FM, pin 4 is high and pin 5 is low; for AM, pin 4 is low and pin 5 is high. Because pin 5 is high and pin 4 is low during AM reception, Q809 is on and Q808 is off, the analogue switches SW1 and SW2 of Q203 are on while SW3 and SW4 are off, so an AM signal is output. Also, since Q706 goes to on and Q705 to off, the AM, kHz segments of the fluorescent display are turned on. Q844 goes to off so the FM indicator is turned off. At the same time, Q155 is turned

During FM reception, this is operated by the IF level detection and zero point detection circuits included in the FM IF system IC of Q103 and by the noise component detection circuit of Q806. When a station is tuned, the output of all outputs go to the low level so Q843 goes from on to off, causing pins 32 and 33 of the controller IC to go to the high level to complete auto search tuning.

During AM reception, the AM IF signal is taken, amplified by Q181, limited to a certain amplitude by the D181 D182 limiter circuits and auto search tuning is completed when the IF signal becomes 450 ± 3 kHz.

• Manual Tuning

When the UP or DOWN key is pressed, the frequency goes up or down by one step. When either key is held down, the frequency rapidly increases or decreases (scans) and stops when the key is released. When either end of the tuning range is reached, key input will no longer be received and the frequency will stop at the highest or lowest frequency.

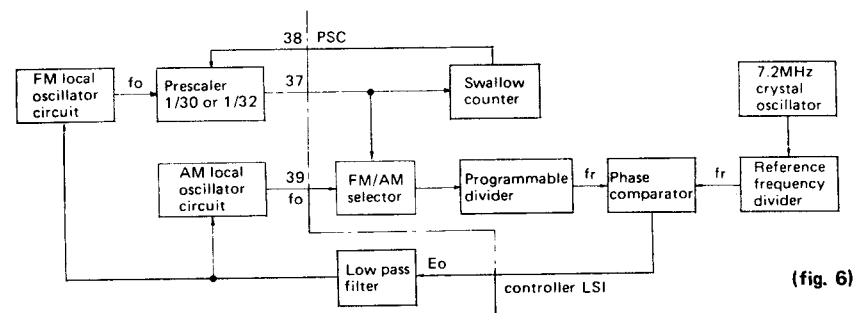
• Auto Tuning

When the UP or DOWN key is pressed, scanning begins in the up or down direction, stopping where there is a radio station. Since auto scan is operated by a triangular wave, scanning is begun in the opposite direction the instant either end of the tuning range is reached. Also, if the UP or DOWN key is pressed when the tuned frequency is not at either end of the range, up or down scanning will begin.

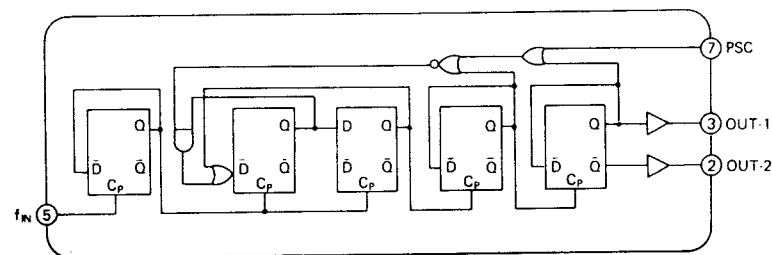
off and Q154 turned on, so +B is supplied to the power source terminal of the radio system pin 3 of Q152.

Pin 16 of Q201 goes to the high level, the VCO oscillator stops, and pin 2 of Q103 goes to the high level so the FM IF amp is also switched off. Also, during AM reception, Q801 is turned on so the muting circuit is off. During FM reception, all of the switching transistors mentioned above perform the opposite operations to switch to the FM mode. Figures in parentheses indicate transistor operation during FM reception.

5. PLL tuned circuit



(fig. 6)



(fig. 7) TD6104P (Prescaler)

A block diagram of the tuned circuit of the PLL is shown in fig. 6.

Operation during AM reception

The reception frequency is applied to the programmable divider where it is divided to $1/N$ and output as f_v . This is applied to the phase comparator where it is compared with frequency reference f_r (9kHz for G/W model and 10kHz for D model). If f_r and f_v differ, E_o equal to the difference in frequency is output. Since error output E_o is a pulse waveform, it is passed through the low pass filter to change it into DC voltage V_D , which is applied to the variable capacitor diode in the front end to change the reception frequency. This continues until f_v and f_r are the same and $E_o=0$.

Operation during FM reception

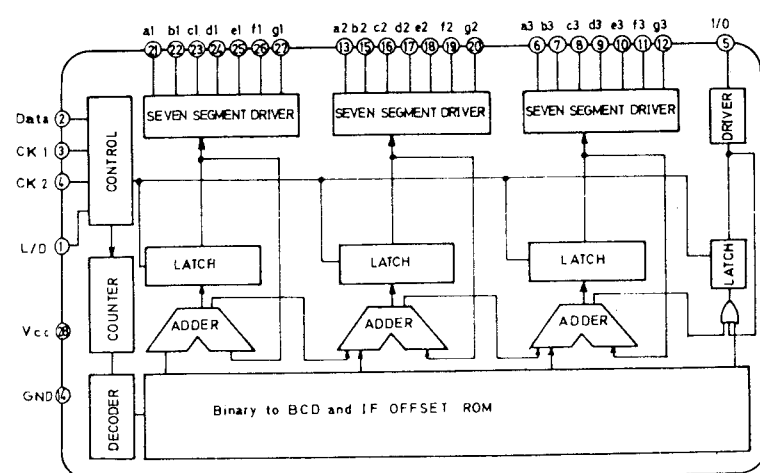
The pulse swallow method is used in the prescaler of this unit. In this type of prescaler, a supplementary number

(changed according to the program code input) and the divided reception frequency from the prescaler are combined in the control counter and the prescaler's division factor is switched 1/30 or 1/32 according to external control (1/32 when the PSC terminal is "H" and 1/30 when it is "L").

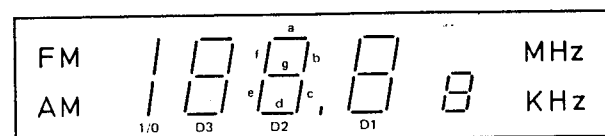
The station oscillator frequency is applied to the programmable divider, but the programmable divider has an upper frequency limit of only 30MHz, so the pulse swallow-type prescaler, which can be used up to 150 MHz, is inserted for division to $1/N_p$.

The signal is applied to the programmable divider and divided to $1/N$. The result is compared with a 25kHz frequency reference in the phase detector and the error is output as E_o until a match is obtained as in AM operation.

6. Frequency indicator circuit

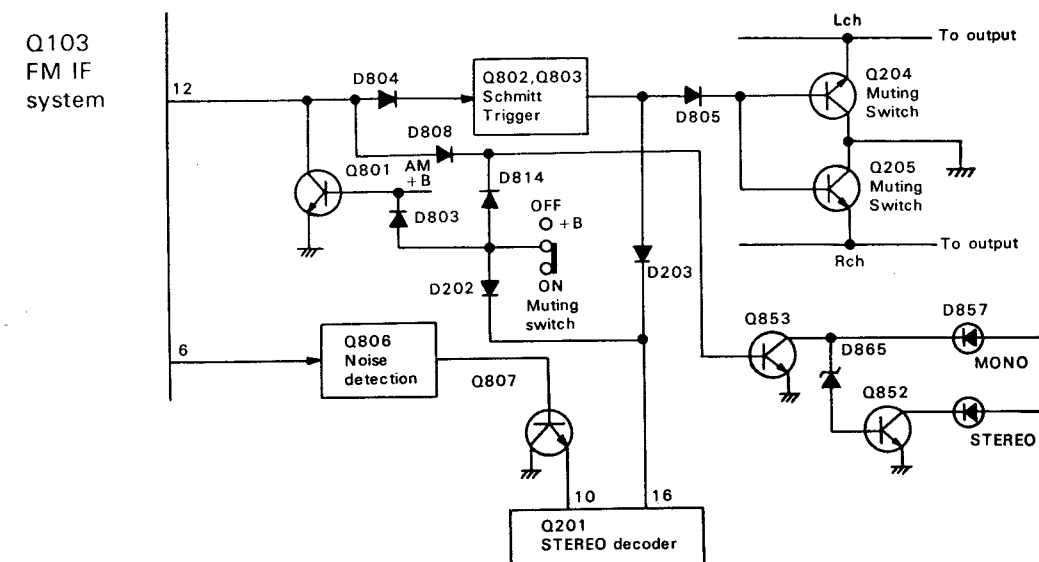


(fig. 8) TD6301AP block diagram



Pin No.	Terminal	Description
1	L/D	Output indication switching input terminal: Fluorescent display at the low level, and LED display at the high level.
2	Data	Tuned frequency data input terminal: Input from the system controller LSI to the serial.
3,4	CK1, CK2	Tuned frequency data input control timing input terminal: Transferred simultaneously with data from the system controller LSI.
5	1/0	Segment drive output terminal: Sets the number of display digit for FM (100MHz) and AM (1,000kHz) reception.
6-12	a3-g3	Seven segment drive output terminals: Sets the number of display digit for FM(10MHz) and AM (100kHz) reception.
13, 15-20	a2-g2	Seven segment drive output terminals: Sets the number of display digit for FM (1MHz) and AM (10kHz) reception
21-27	a1-g1	Seven segment drive output terminals; set the number of display digit for FM (100kHz) and AM (1kHz) reception
14	Vcc	Power source terminal
28	Gnd	Ground

7. Muting circuit



The muting circuit operates in the following cases.

- While pin 28 of the controller IC outputs the high level, Q204 and Q205 are turned on and muting is closed in the following cases: (1) While the manual UP/DOWN switch is being held down, (2) When a station in the memory is recalled, and (3) While a radio station is being received using auto search tuning.
- When an FM station is not being received (and the muting switch is on).

The IF level in the FM IF system (set at R116 so muting is opened at 17 dBf) and zero point detection circuit (tuning point 35 ± 15 kHz) are output at pin 12 through

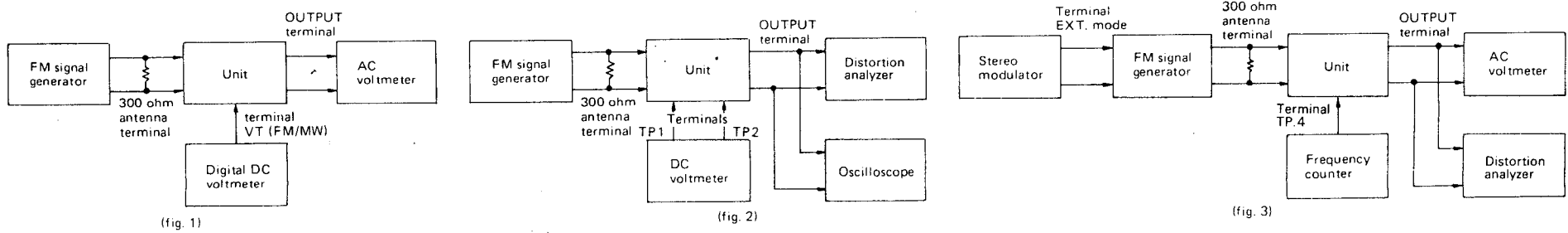
the AND circuit. When a station is tuned, the output goes to the low level.

When output goes to the low level, Q802 is turned off, Q803 is turned on and Q203 and Q204 are turned off, so muting is opened. At the same time, pin 16 of stereo decoder Q201 goes to the low level, so the VCO oscillator starts.

ADJUSTMENT PROCEDURES

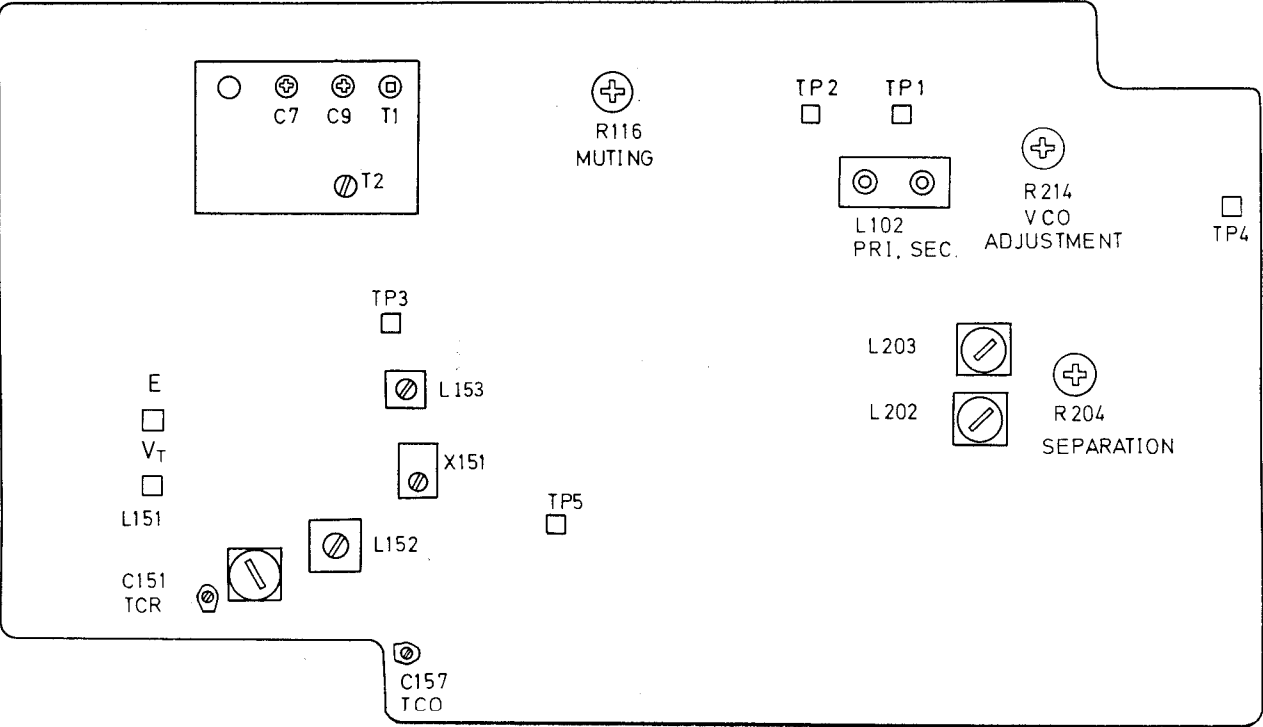
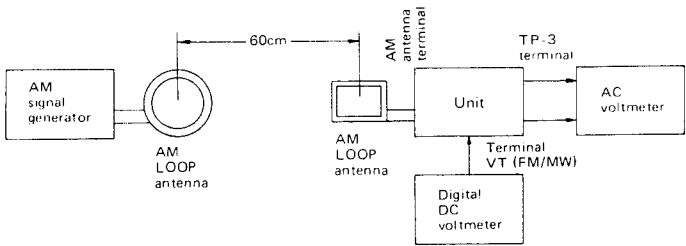
FM section

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Turning dial setting	Output indicator	Adjustment	Adjust for	Remarks
FM RF	1	Fig. 1	—	—	88.0 MHz	Digital DC voltmeter	T1	1.4V	
	2	Fig. 1	107.9 MHz 1 kHz, 75 kHz devi.	—	107.9 MHz	AC voltmeter	C7, C9	Maximum output	
FM IF	1	Fig. 2	98.1 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	—	98.1 MHz	DC voltmeter	L101 Primary coil	0V	Repeat the steps 1 and 2 until no further adjustment is necessary
	2	Fig. 2		—	98.1 MHz	Distortion analyzer	L101 Secondary coil	Minimum	
VCO		Fig. 3	98.1 MHz No modulation 65 dBf (60 dB)	—	98.1 MHz	Frequency counter	R214	19 kHz ± 19 Hz	Remove the frequency counter after adjustment
Separation	1	Fig. 3	98.1 MHz 65 dBf (60 dB) Ext. modulation	L ch. 1 kHz	98.1 MHz	R ch. AC voltmeter	R204	Minimum	Maximum and same separation
	2			R ch. 1 kHz		L ch. AC voltmeter		Minimum	
Distortion		Fig. 3	98.1 MHz 65 dBf (60 dB) Ext. modulation	L+R 1 kHz	98.1 MHz	Distortion analyzer	T2	Minimum	
Muting level	1	Fig. 2	98.1 MHz 17.2 dBf (12 dB) 1 kHz, 75 kHz devi.	—	98.1 MHz	Oscilloscope	R116	Signal output	Muting switch to on.
	2		98.1 MHz 16.2 dBf (11 dB) 1 kHz, 75 kHz devi.					No output	



AM section

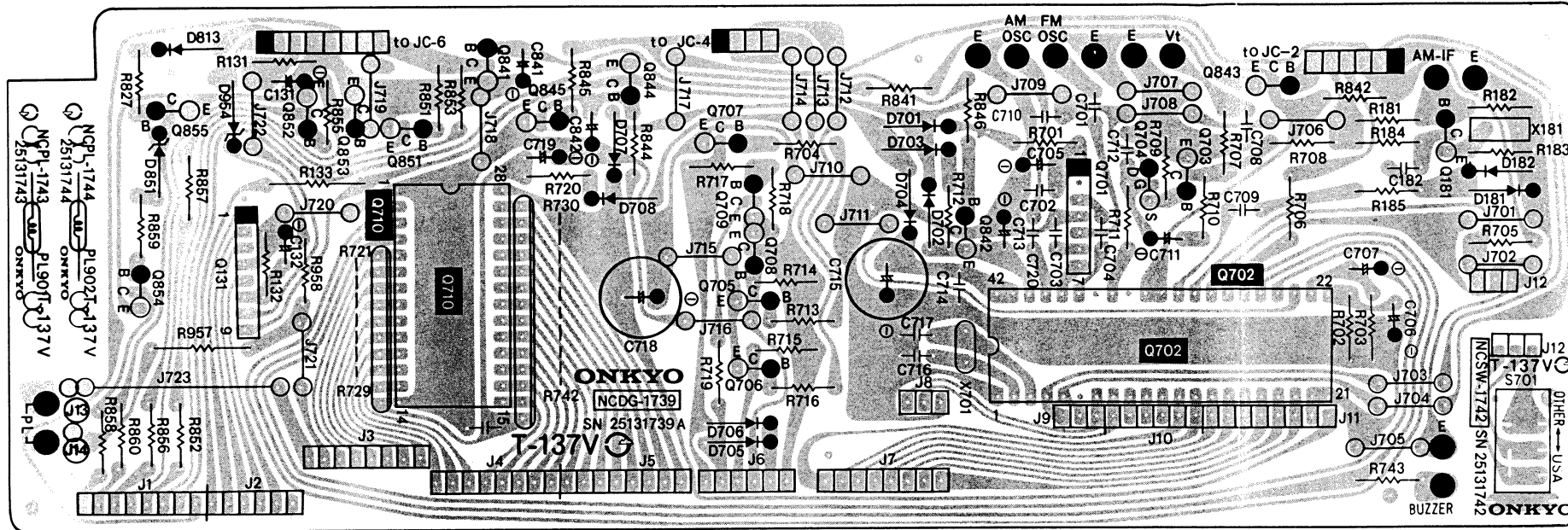
Step	AM SG output	Tuned frequency	Output indicator	Adjustment point	Adjust for	Remarks
1	999kHz 400Hz 30% mod.	999kHz	AC voltmeter	X151 L153	Maximum	
2		522kHz	Digital DC voltmeter	L152	1.2V	Repeat the steps 2 and 3 until no further adjustment is necessary.
3		1611kHz	Digital DC voltmeter	C157	9.5V	
4	603kHz 400Hz 30% mod.	603kHz	AC voltmeter	L151	Maximum	Repeat the steps 4 and 5 until no further adjustment is necessary.
5	1404kHz 400Hz 30% mod.	1404kHz	AC voltmeter	C151	Maximum	



TX-200
TX-200

PCB PARTS LIST / VIEW FROM COMPONENT SIDE

DIGITAL CIRCUIT PCB VIEW



TUNER SWITCH PC BOARD ASS'Y (NASW-1741)

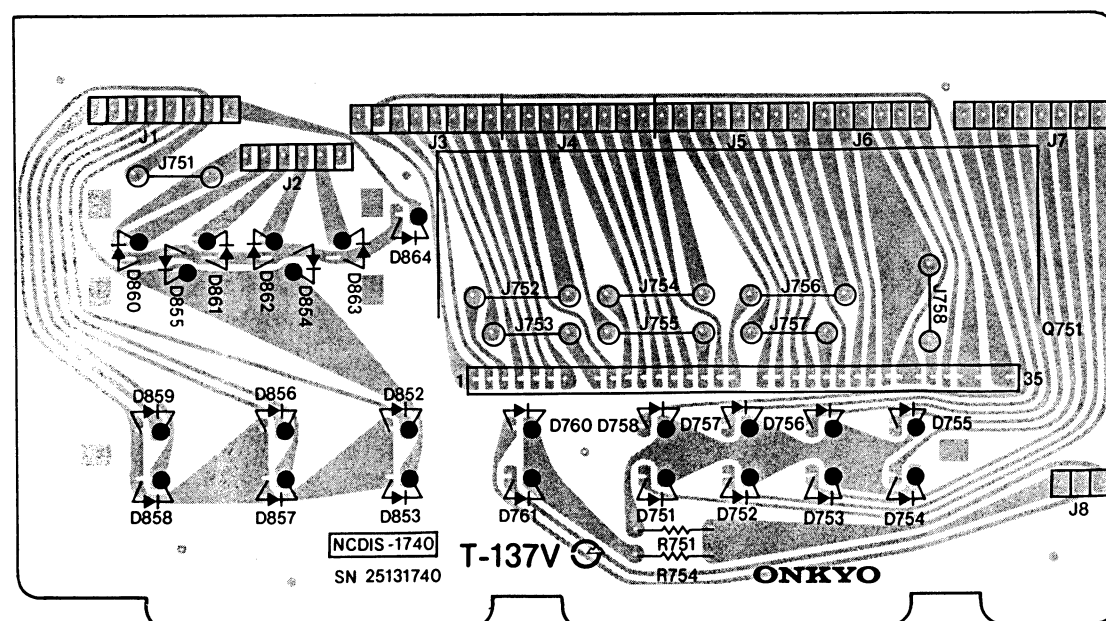
CIRCUIT NO.	PART NO.	DESCRIPTION
LEDs		
D759	225126	GL3PR1
D865, D866	225137	SEL2413E
D867, D868	225142	SEL2913K
Switches		
S751-S765	25035275	NPS-111-S239
Spacer		
	27270103	
Holders		
	27190224	LED

DIAL PLATE ILLUMINATION LAMP PC BOARD ASS'Y (NAPL-1743/1744)

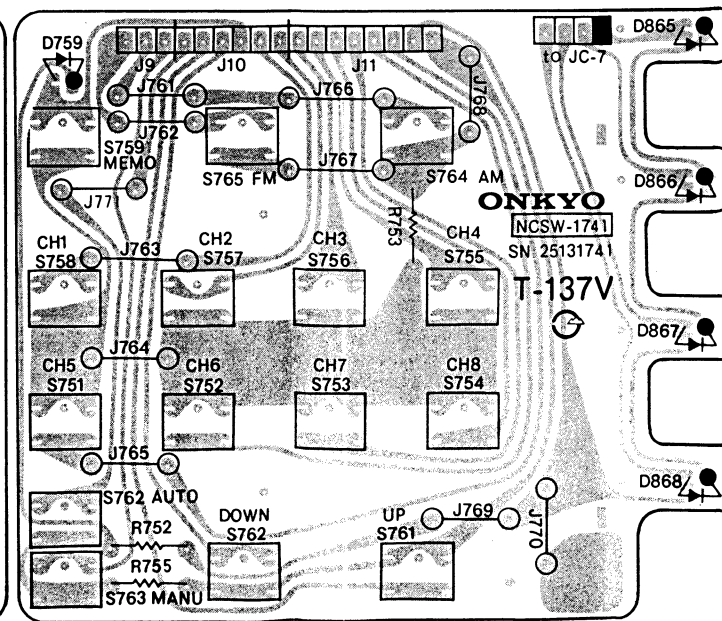
CIRCUIT NO.	PART NO.	DESCRIPTION
PL901	210162	PL6. 3V0. 25A, Lamp

MC-Service

FLUORESCENT INDICATOR TUBE PCB VIEW



TUNER SWITCH PCB VIEW



DIGITAL CIRCUIT PC BOARD ASS'Y (NADG-1739a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q701	222675	TD6104P, Prescaler
Q702	222674	TC9147P, PLL synthesizer/controller
Q710	222673	TD6301AP, Static frequency indicator driver
Transistors		
Q703	2211255	2SC1815 (GR)
Q704	2212294	2SK108 (D)
Q705, Q706	2211254	2SC1815 (Y),
Q841, Q843	2211255 or	2SC1815 (GR) or
Q853, Q855	2210746	2SC945A (P)
Q844, Q852, Q854	2211256	2SC1815 (BL)
Q707, Q708	2211255	2SC1815 (GR)
Q709	2211455	2SA1015 (GR)
Q181	2210823	2SC1675 (L-1)
Diodes		
D181, D182	223105,	1S1555,
D701-D704	223133 or	DS442X or
D707, D708	223145	1S2076TD
D813		
D705, D706	223105,	1S1555,
	223133 or	DS442X or
	223145	1S2076TD
D851, D852	224178,	05Z9. 1Y,
	2241052 or	GZA9. 1EB3 or
	2239573	RD9. 1EB3
D954	2239433	RD4. 7EB3
Ceramic filter		
X181	3010076	BFU450C
X'tal		
X701	3010073	XTL-7.2M
Capacitors		
C705	352734709	47μF, 10V, Elect.
C706	352780109	1μF, 50V, Elect.
C707	352780229	2.2μF, 50V, Elect.
C711	395160107	1μF, 35V, Tantalum
C713	352784799	0.47μF, 50V, Elect.
C715	3020018	0.047F, 5V, Super
C718	352722229	2,200μF, 6.3V, Elect.
C719	352751009	10μF, 25V, Elect.
C841	352780339	3.3μF, 50V, Elect.
Resistors		
R721-R729	49121333509	33kohm×9, 1/8W, Network
R730-R742	49121333513	33kohm×13, 1/8W, Network
R957	441523904	39ohm, 1/2W, Metal oxide film

FLUORESCENT INDICATOR TUBE PC BOARD ASS'Y (NADIS-1740)

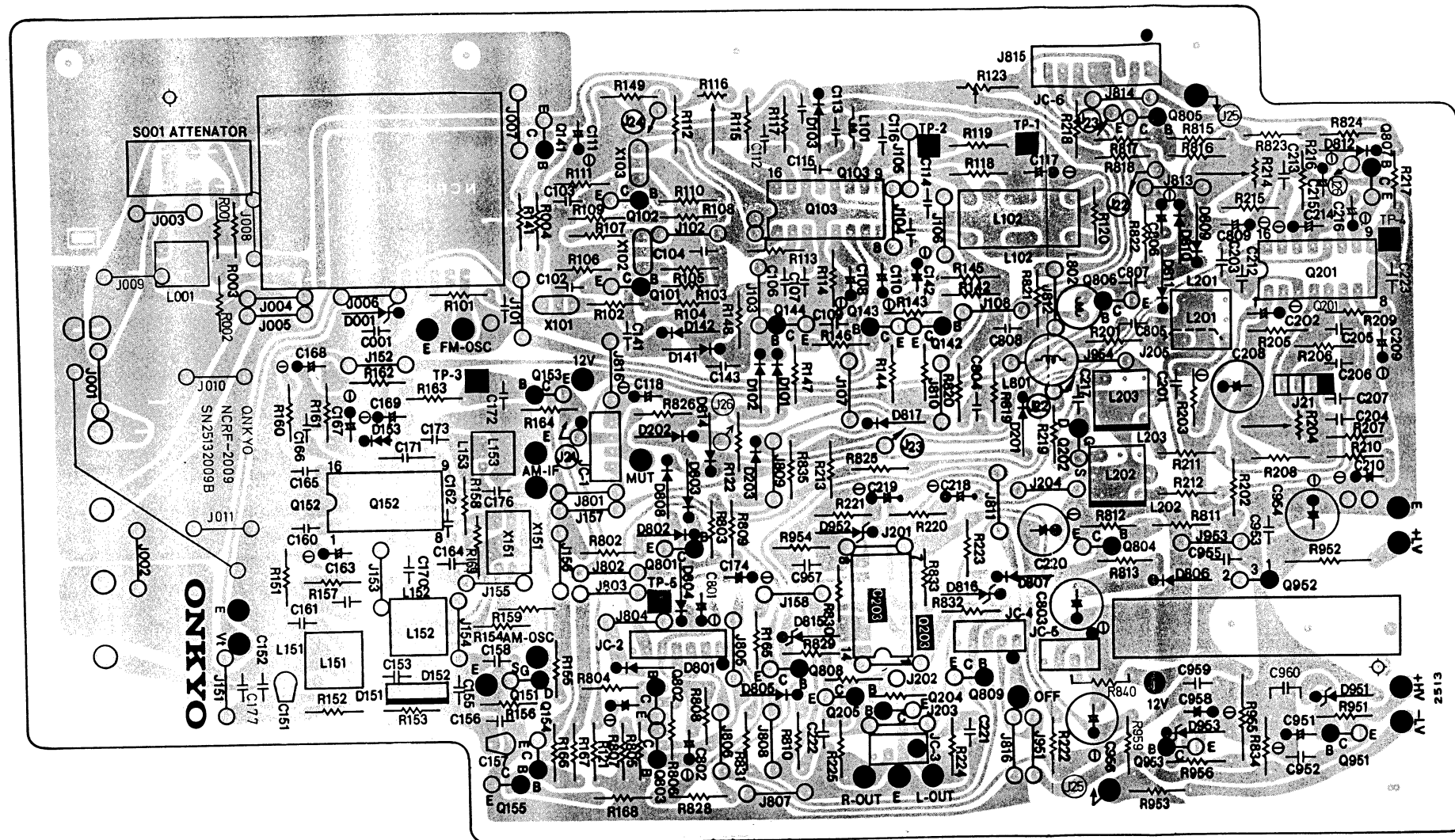
CIRCUIT NO.	PART NO.	DESCRIPTION
Fluorescent indicator tube		
Q751	212016	FIP7B8CS
LEDs		
D751-D758	225142	SEL2913K
D761		
D760, D859	225137	SEL2413E
D854, D855	225142	SEL2913K
D856-D858	225141	SEL2213C
D864		
Holders		
	27190222	LED16
	27190223	LED3
Cushion		
	28140513	

TX-200

TX-200

PCB PARTS LIST/VIEW FROM COMPONENT SIDE

FM/AM TUNER PCB VIEW



FM/AM TUNER PC BOARD ASS'Y (NARF-2009 a)

CIRCUIT NO.	PART NO.	DESCRIPTION
Front end		
TU001	240059	FE416U33
ICs		
Q103	222608	μ PC1167C
Q152	222804 or 222629	μ PC1168C or μ PC1243C
Q201	2222678	μ PC1161C3
Q203	222575 or 222840661	TC4066BP or 4066B
Q952	222780122	78M12
Transistors		
Q101	2211723	2SC1923(O)
Q102	2211723	2SC1923(O)
Q151, Q202	2211945 or 2212304	2SK246(GR) or 2SK381(D)

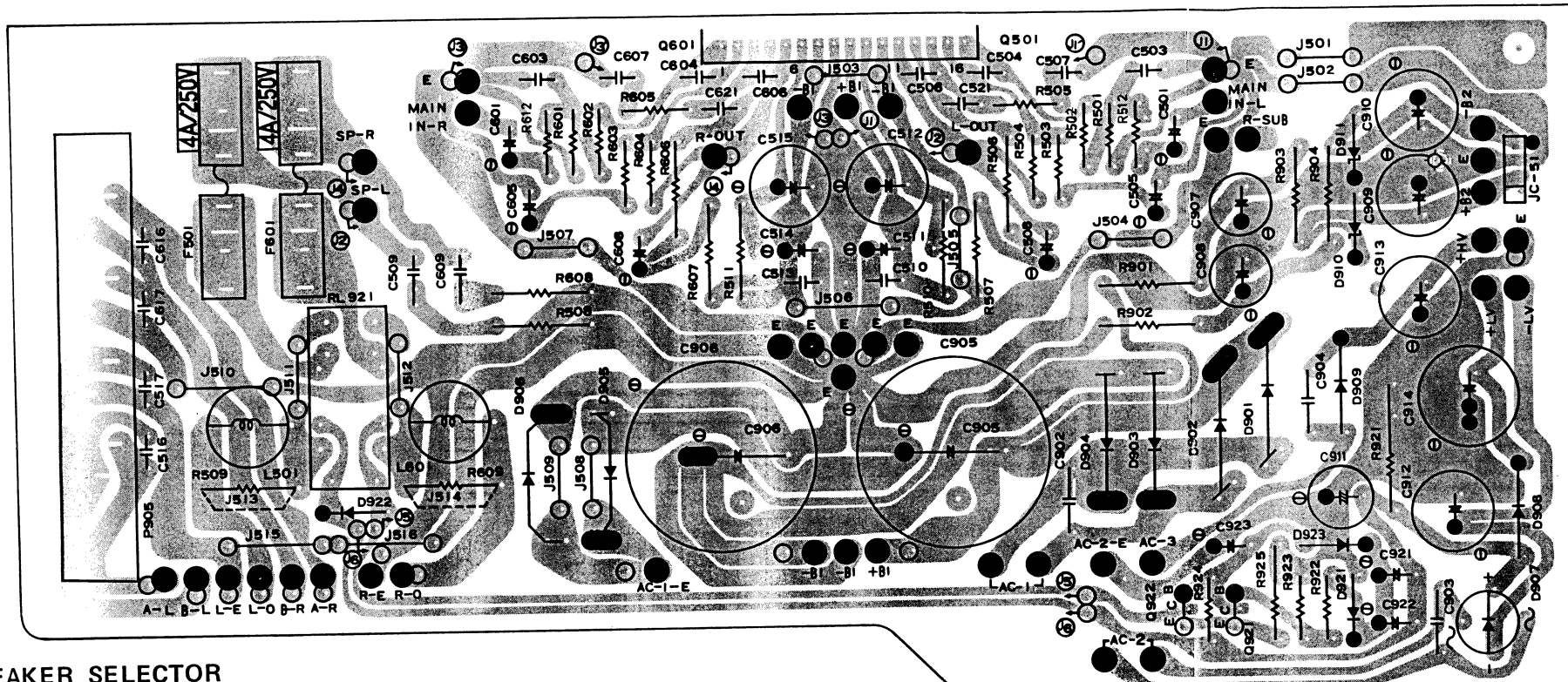
CIRCUIT NO.	PART NO.	DESCRIPTION
Q153-Q155	2211254,	2SC1815(Y),
Q801-Q804	2211255,	2SC1815(GR),
Q807-Q809	2210746,	2SC945A(P),
	2212484 or 2212485	JC501P or JC501Q
Q204, Q205	2211705	2SD655(E)
Q805, Q806	2211255	2SC1815(GR)
Q951, Q953	2211255	2SC1815(GR)
Diodes		
D001	2243192,	MTZ8.2B,
	2242866 or 2239552	EQA02-08C or RD8.2EB2
D102	223105,	1S1555,
D201-D203	223133,	DS442X,
D801-D805	223145 or 223150	1S2076TD or US1040
D814, D817		
D103, D153	4000068	VD1222
D151, D152	223140	KV1236

MC-Service

CIRCUIT NO.	PART NO.	DESCRIPTION
D815, D816	2241291	RD3.3EB1
D951	2239792,	RD27EB2,
	2243012 or 2242741	EQA02-25B or GZA27X
D952	2239433,	RD4.7EB3,
	2243133 or 2242835	MTZ-4.7C or EQA02-05B
D953	2239433,	RD6.2EB3,
	2243163 or 2242848	MTZ6.2C or EQA02-06E
Transformers		
L102	233270	NF1F-6040
L153	232095	NM1F-6025
Coils		
L001	233312	NFA-3051
L101	233105 or 233024	NCH-1005 or NCCH-1501
L151	232113	NMA-3049
L152	232084	NMO-2018
L201	233236	NMC-6027
L202, L203	233291	NMC-5039
L801	231042	NCH-2082
L802	233031	NMC-9-1
Ceramic filters		
X101-X103	3010043	SFE10.7MM
X151	3010075	SFL450B3
Capacitors		
C108, C110	352780109	1 μ F, 50V, Elect.
C111	352784799	0.47 μ F, 50V, Elect.
C117	352741009	10 μ F, 16V, Elect.
C151, C157	3060010	NTC20P09, Trimmer
C155	370135114	510pF \pm 5%, 100V, APS
C163	352741019	100 μ F, 16V, Elect.
C167	352741009	10 μ F, 16V, Elect.
C168	352750479	4.7 μ F, 25V, Elect.
C169	352741009	10 μ F, 16V, Elect.
C174	352784799	0.47 μ F, 50V, Elect.
C202	352750479	4.7 μ F, 25V, Elect.
C208	352744719	470 μ F, 16V, Elect.
C209, C210	352741009	10 μ F, 16V, Elect.
C213	370134714	470pF \pm 5%, 100V, APS
C214	352780109	1 μ F, 50V, Elect.
C215	352780339	3.3 μ F, 50V, Elect.
C216	352782299	0.22 μ F, 50V, Elect.
C218, C219	352780109	1 μ F, 50V, Elect.
C220	352724719	470 μ F, 6.3V, Elect.
C801	352780109	1 μ F, 50V, Elect.
C802	352780229	2.2 μ F, 50V, Elect.
C806	352783399	0.33 μ F, 50V, Elect.
C809	352780229	2.2 μ F, 50V, Elect.
C951	352780109	1 μ F, 50V, Elect.
C954	352751019	100 μ F, 25V, Elect.
C956	352724719	470 μ F, 6.3V, Elect.
C958	352780109	1 μ F, 50V, Elect.
Resistors		
R116	5215003	N08HR20KBC, Semi-fixed
R204	5215048	N08HR200KBC, Semi-fixed
R214	5215044	N08HR5KBC, Semi-fixed
R952	441721204	12ohm, 2W, Metal oxide film
R955	441523904	39ohm, 1/2W, Metal oxide film
Terminal		
P901	25060083	NTM-5PDMN27, Antenna

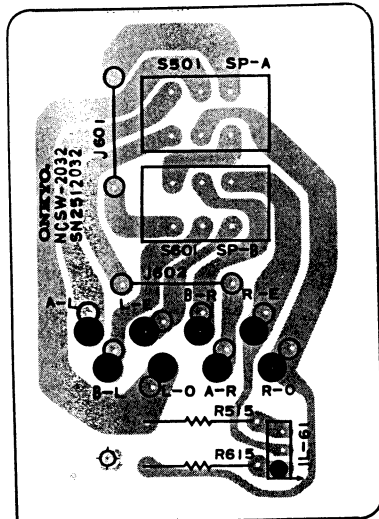
PCB PARTS LIST/VIEW FROM COMPONENT SIDE

POWER SUPPLY AND AMPLIFIER PCB VIEW



SPEAKER SELECTOR

SWITCH PCB VIEW



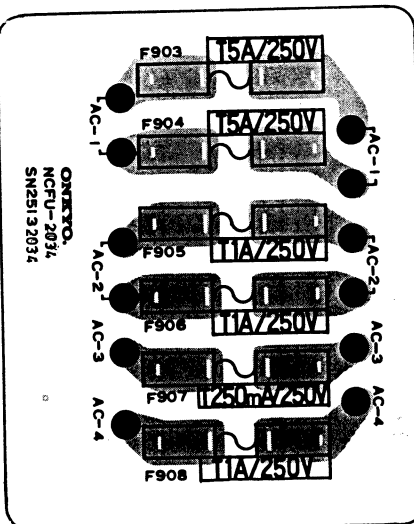
SPEAKER SELECTOR SWITCH PC BOARD ASS'Y (NASW-2032)

CIRCUIT NO.	PART NO.	DESCRIPTION
Resistors		
R515, R615	441522714	270ohm, 1/2W, Metal oxide film
Switches		
S501, S601	25035397	NPS-222-L361

HEADPHONE TERMINAL PC BOARD ASS'Y (NAHP-2033)

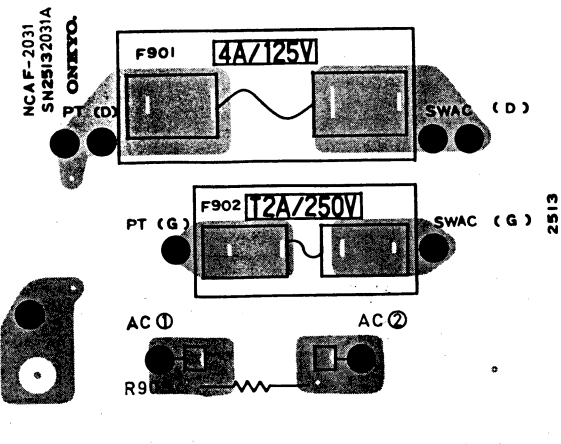
CIRCUIT NO.	PART NO.	DESCRIPTION
P906	25045138	HLJ0520-01-010

FUSE PCB VIEW



FUSE TERMINAL PC BOARD ASS'Y (NAFU-2034)

CIRCUIT NO.	PART NO.	DESCRIPTION
Fuseholders		
	25050065	YSH403T
Fuses		
△ F903, F904	252078	5A-SE-EAK
△ F905, F906	252070	1A-SE-EAK
△ F907	252088	250mA-SE-EAWK



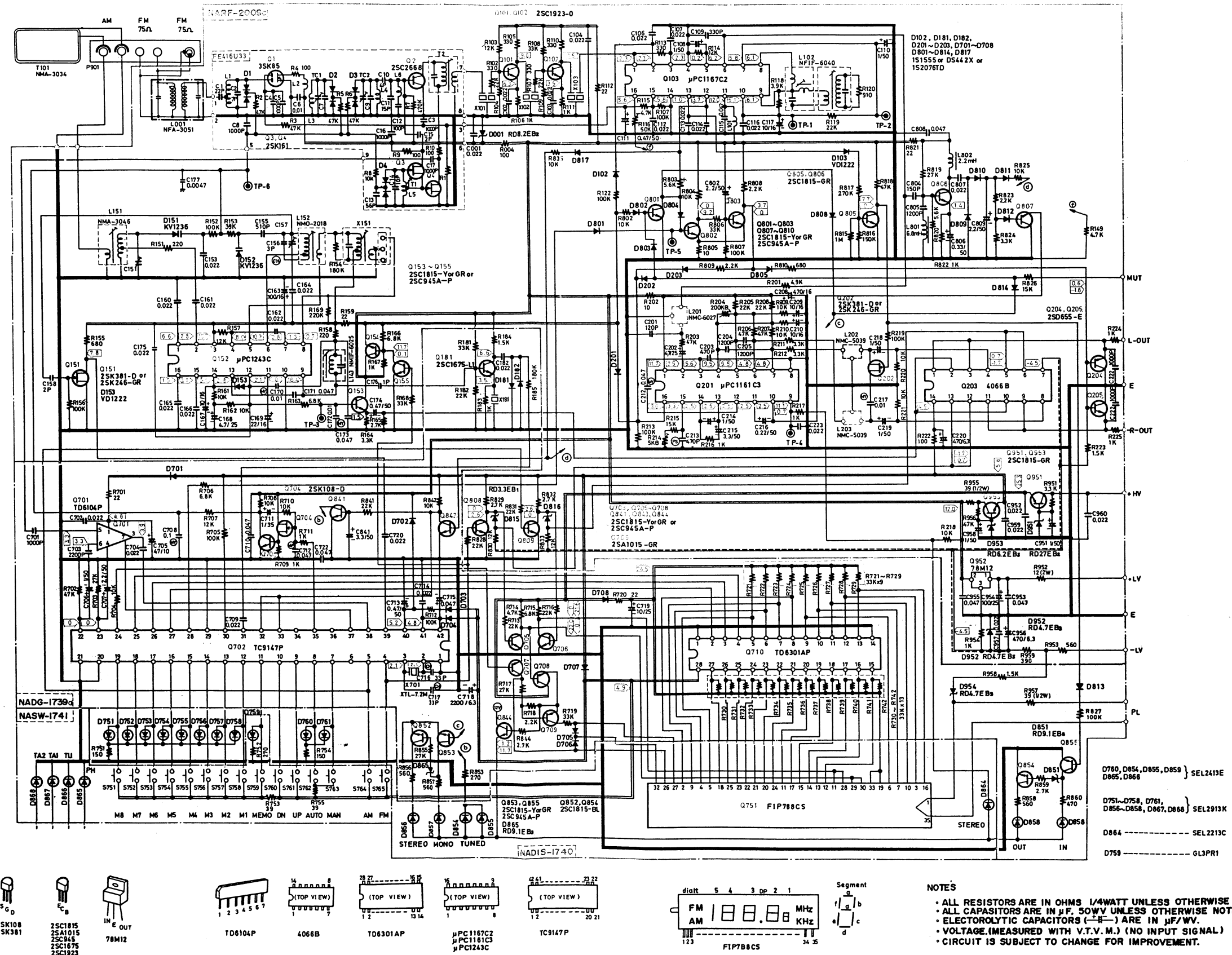
NOTE: THE COMPONENTS IDENTIFIED BY MARK
△ ARE CRITICAL FOR RISK OF FIRE AND
ELECTRIC SHOCK. REPLACE ONLY WITH
PARTS NUMBER SPECIFIED.

POWER SUPPLY AND POWER AMPLIFIER CIRCUIT
PC BOARD ASS'Y (NAAF-1750a)

CIRCUIT NO.	PART NO.	DESCRIPTION
IC		
Q501, Q601	222041	STK-4843, Power amplifier
Transistors		
Q921	2211255	2SC1815 (GR)
Q922	2211254	2SC1815 (Y)
Diodes		
D901-D906	223845	GP-20D
D907	223862	WL-01
D908, D909	223880	GP101N4003
D910, D911	2241191, 2241192 or 2243273	GZA-18X, GZA-18Y or MTZ-18C
D921-D923	223145, 223133, 223105 or 223150	1S2076TD, DS442X, 1S1555 or US1040
Coils		
L501, L601	231001	S1.3B
Capacitors		
C501, C601	352780479	4.7μF, 50V, Elect.
C505, C605	352731019	100μF, 10V, Elect.
C508, C608	352784709	47μF, 50V, Elect.
C511, C514	352781009	10μF, 50V, Elect.
C512, C515	352781019	100μF, 50V, Elect.
C905, C906	3504177	6,800μF, 42V, Elect.
C907, C908	352761019	100μF, 35V, Elect.
C909, C910	352752219	220μF, 25V, Elect.
C911	352761019	100μF, 35V, Elect.
C912	352764719	470μF, 35V, Elect.
C913	352783319	330μF, 50V, Elect.
C914	352752229	2,200μF, 25V, Elect.
C921	352753309	33μF, 25V, Elect.
C923	352780339	3.3μF, 50V, Elect.
Resistors		
R506, R606	441523324	3.3kohm, 1/2W, Metal oxide film
R507, R607	441521024	1kohm, 1/2W, Metal oxide film
R508, R608	441520474	4.7ohm, 1/2W, Metal oxide film
R509, R609	441520474	4.7ohm, 1/2W, Metal oxide film
R510	441521014	100ohm, 1/2W, Metal oxide film
R511	441525614	560ohm, 1/2W, Metal oxide film
R901-R904	441524714	470ohm, 1/2W, Metal oxide film
R921	441621024	1kohm, 1W, Metal oxide film
R925	441522704	27ohm, 1/2W, Metal oxide film
Relay		
RL921	25065108	NRL-2P3A-DC24-05
Terminal		
P905	25060058	NTM-8PDML25, Speaker
Fuseholders		
F902a	25050065	YSH403T
F501a, F601a	25050065	YSH403T
Fuses		
△ F501, F601	252076	3.15A-SE-EAK, Speaker
△ F902	252074	2A-SE-EAK, Primary

MC-Service

SCHEMATIC DIAGRAM



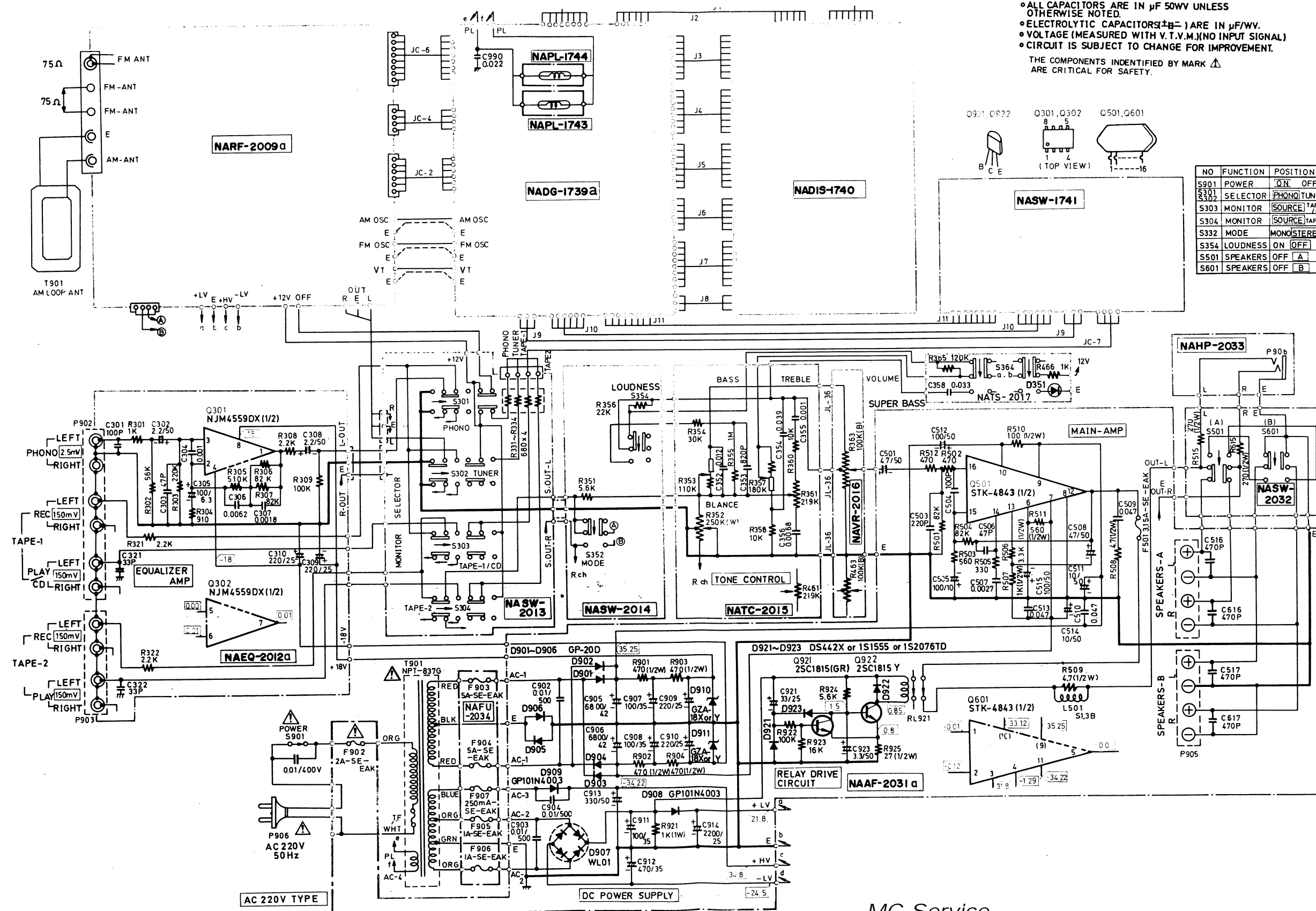
SCHEMATIC DIAGRAM

NOTES

- ALL RESISTORS ARE IN OHMS 1/4WATT UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN μ F 50V UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS ARE IN μ F/VV.
- VOLTAGE (MEASURED WITH V.T.V.M.) (NO INPUT SIGNAL).
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY.

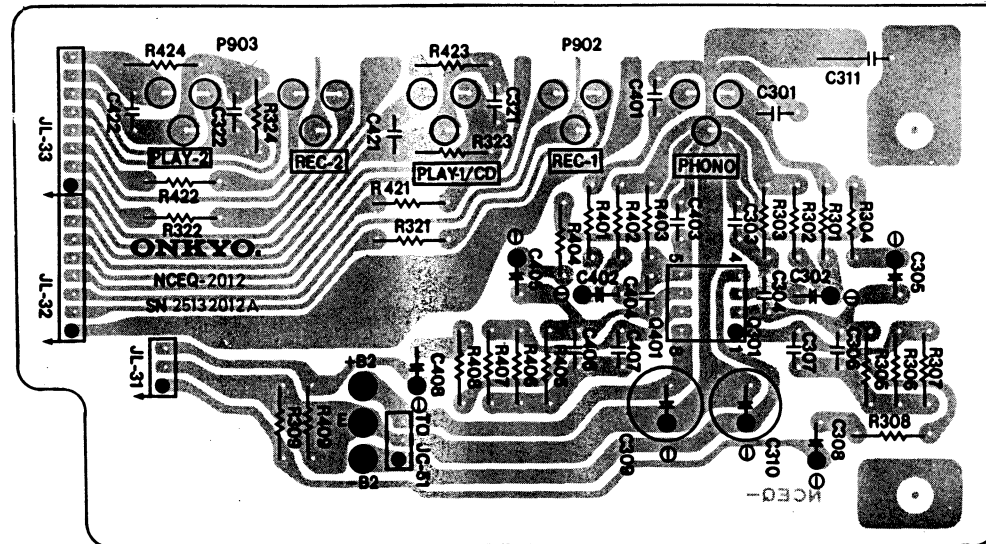
NO	FUNCTION	POSITION
S901	POWER	ON OFF
S301	SELECTOR	PHONO TUNER
S303	MONITOR	SOURCE TAPE-1
S304	MONITOR	SOURCE TAPE-2
S332	MODE	MONO/STEREO
S354	LOUDNESS	ON OFF
S501	SPEAKERS	OFF A
S601	SPEAKERS	OFF B



MC-Service

PCB PARTS LIST/VIEW FROM COMPONENT SIDE

EQUALIZER AMPLIFIER PCB VIEW

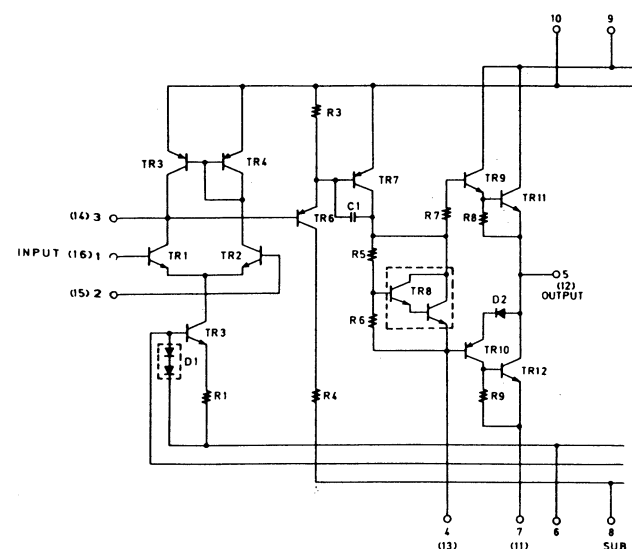


EQUALIZER AMPLIFIER PC BOARD ASS'Y (NAEQ-2012a)

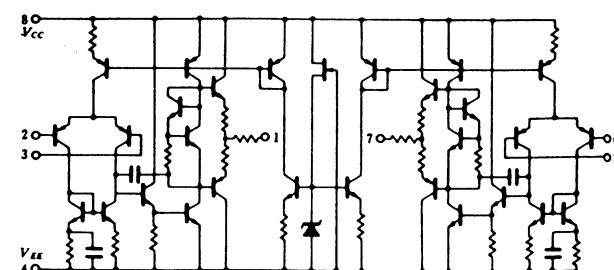
CIRCUIT NO.	PART NO.	DESCRIPTION
Q301, Q401	IC	
	222534	NJM-4559DX
	222502 or	NJM-4558DX or
	222570	NJM-4560DX
C302, C402	Capacitors	
	352780229	2.2μF, 50V, Elect.
	352721019	100μF, 6.3V, Elect.
	352780229	2.2μF, 50V, Elect.
	352752219	220μF, 25V, Elect.
P902	Terminals	
	25045137	NPJ-6PDBL52, Phono/Tape 1
	25045084	NPJ-4PDBL42, Tape 2

BLOCK DIAGRAM

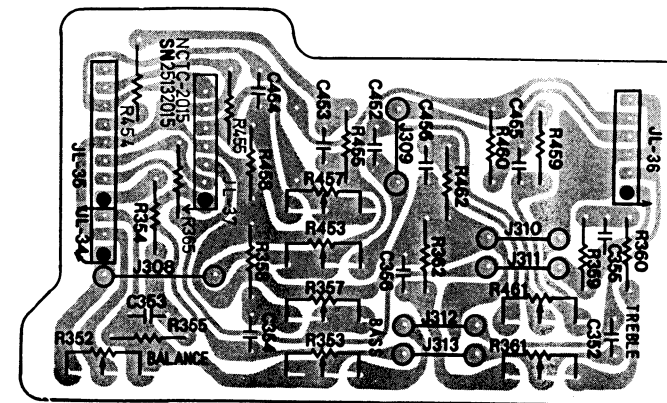
STK-4843 (Power amplifier)



NJM-4559DX (Equalizer amplifier)



TONE CONTROL PCB VIEW



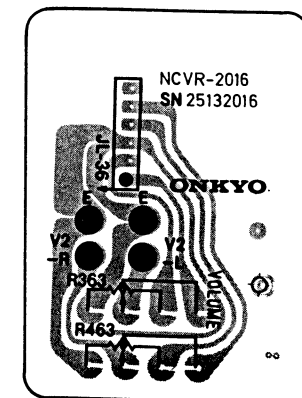
TONE CONTROL CIRCUIT PC BOARD ASS'Y (NATC-2015)

CIRCUIT NO.	PART NO.	DESCRIPTION
R352	Variable resistors	
	5146034	N16RLC250KWT30, Balance
	5148073	N16RQMC110K180K30, Bass
	5148074	N16RGMC219K30, Treble

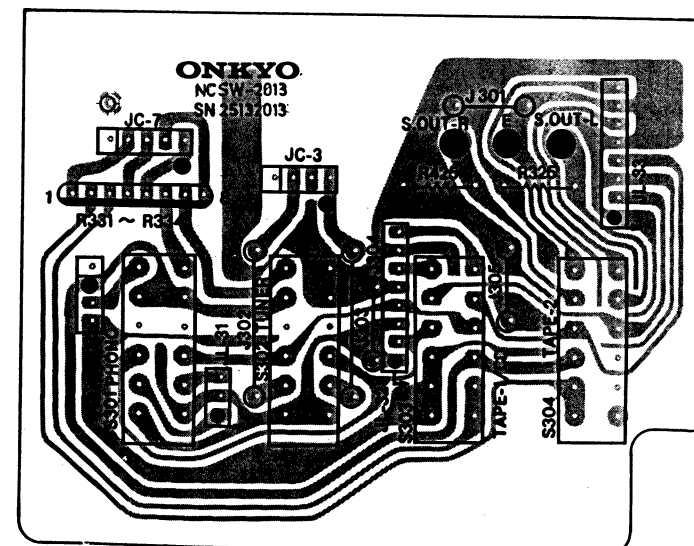
VOLUME CONTROL PC BOARD ASS'Y (NAVR-2016)

CIRCUIT NO.	PART NO.	DESCRIPTION
R363, R463	5148093	N16RGM100KBT35, Variable resistor

VOLUME CONTROL PCB VIEW

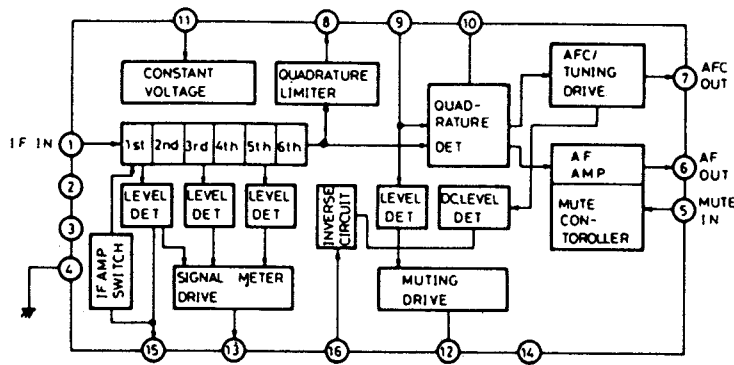


SELECTOR SWITCH PCB VIEW



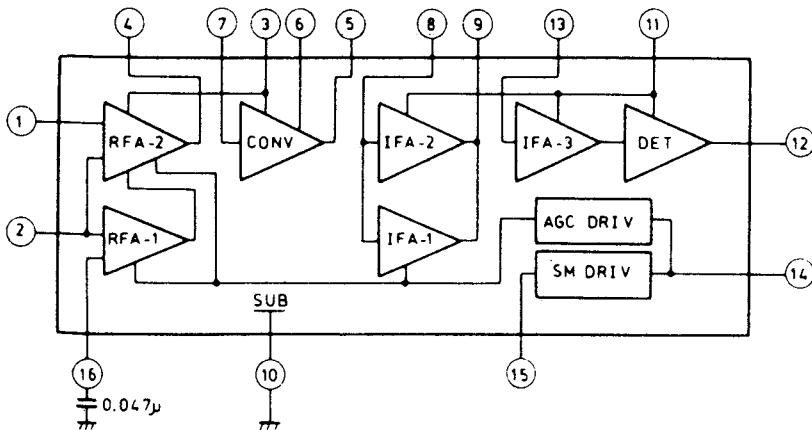
BLOCK DIAGRAM OF IC

μ PC1267 (FM IF system)

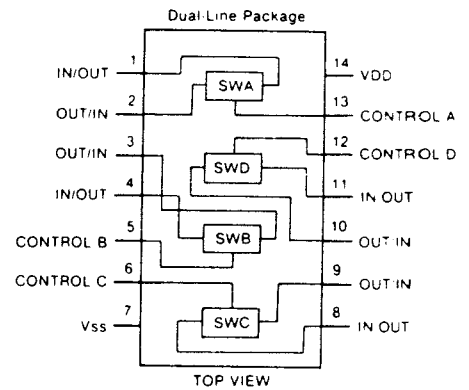


1. IF signal input
2. IF amplifier switch input
H level: Off
5. Muting switch input
6. Composite signal output
7. AFC output
8. IF amplifier output
9. 10.7MHz input
10. Reference voltage
11. Power supply
12. Muting output
Tuned: L level
13. Signal strength output
15. AGC output
16. Muting level

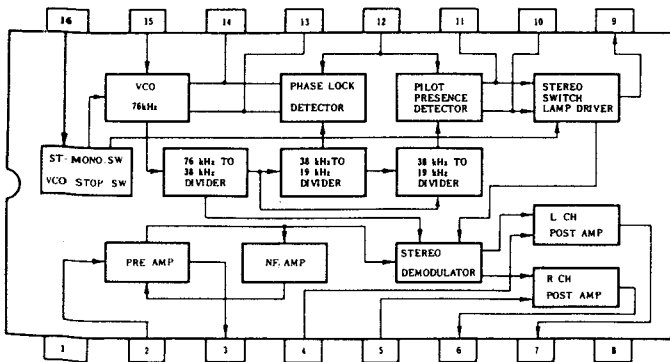
μ PC1243C/ μ PC1168C (AM radio system)



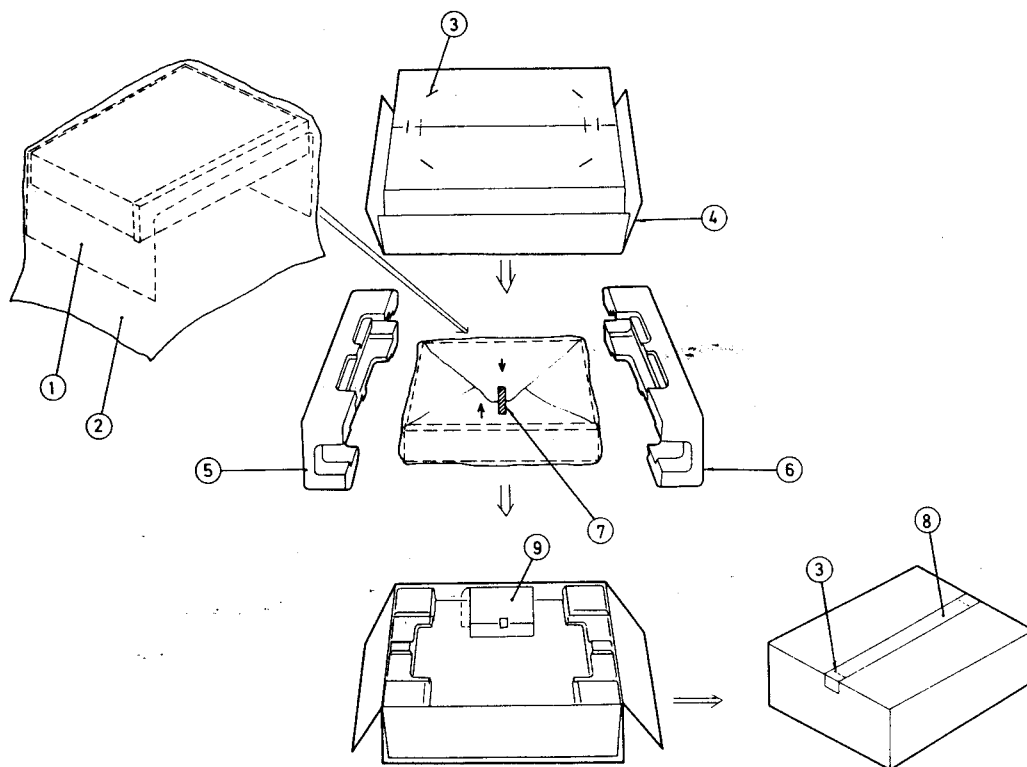
TC4066BP (Analogue switch)



μ PC1161C3 (Stereo decoder)



PACKING VIEW



REF. NO.	PARTS NO.	DESCRIPTION
1	29095012-1	500x800mm, Protection sheet
2	29100034	650x850mm, Poly-vinyl bag
3	282301	Sealing hook
4	29050969	Master carton box
	29050970	Master carton box (B)
5	29090817A	Pad R
6	29090816B	Pad L
7	29110032	W=15mm, Adhesive tape
8	260012	50(W)x600mm, Dampson tape
9	Accessory bag complete	
	292064A	FM antenna
	29100006	350x250mm, Poly-vinyl bag
	29340772	Instruction manual
	29365016	Warranty card

Note: (B): Only black model

ONKYO CORPORATION

International Division: No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Shinbashi, Minato-ku, Tokyo, Japan
Telex: 2423551 ONKYO J. Phone: 03-432-6981

ONKYO DEUTSCHLAND GMBH, ELECTRONICS

8034 München-Germering, Industriestrasse 18, West Germany Telex: 521 726 Telefon: (089)-84-3071